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**ABSTRACT:** This paper is a review of the literature concerning the use of a complex adaptive systems approach to social science and provides a theoretical template upon which a complex systems model of social deviance could be established.

## **COMPLEXITY OF SOCIAL DEVIANCE**

### **Complex Adaptive Systems in Social Science**

Complex Adaptive Systems methodology was first applied to social behavior and used as a social science technique in 1968 by sociologist Walter Buckley [1]. Society functions as a complex adaptive system because “complexity arises when dependencies among the elements become important” [2]. Many approaches to social science attempt to render society merely as a complicated system, which is a flat interpretation. Viewing society as a complicated world makes assumptions that a particular component part can be analyzed in an attempt to understand the whole. This is often not a reliable way to understand social phenomenon because understanding an individual or small group in society, while in itself a complex system, is not representative of the interactions that occur across the larger system. Generalizability is a goal of social science research [3]. Social scientists attempt to reach this goal by randomly sampling the target population or by eliminating bias in their samples through statistically weighting out distinguishing features of each case until a clean statistical measure that is thought to be generalizable is produced. Social scientists using conventional research methods begin with many variables and attempt to eliminate differences using those variables. A complex systems

approach emphasizes using fewer variables and adapting models based on similarities to produce predictive measures [2].

The benefit of a complex adaptive system model over a traditional predictive model of social behavior is that traditional methods predict based solely on previous data, whereas a properly calibrated complex adaptive systems model may be able to predict future trends in social behavior based on changes in policy or social climate. A complex model of social behavior also allows for complexity in the system and even in the agents. Traditional models of social research are mostly linear and rely on a certain level of fixedness to the society being studied, whereas a complex adaptive system model can be adapted to account for changes in the societal context [2, 3]. A potential problem with a complex adaptive system model of social behavior is that there is no method to verify its accuracy before it is used for policy recommendations or before particular policies are implemented. The same limitation also exists for all other methods of social prediction as well. The appropriateness of using a complex systems model for any particular case of predictive need should be weighed in the context of the situation.

### **Complex Systems Approach to Social Deviance**

An area of society that produces considerable complexity, complication and theoretical difficulty is societal deviance. Societal deviance is a deviation from societal norms, which are established procedures or rules in a given society. Norms take the forms of folkways, mores, rules and laws. Folkways are the general customs adhered to by a society. These may include general customs of manners, etiquette or societal procedures for which there are no formal

sanctions for violating. Mores are stricter than folkways, providing for a variety of moral and ethical guidelines for behavior which may be enforced by informal or semi-formal sanctions. Rules are typically implemented at the institutional or group level and have no formal sanctions in the view of the larger society. Laws are established and written codes of conduct for which there are established procedural formal sanctions [4]. The norms used in society are the behavior that is being used as the standard or as a baseline for behavior. The norms of society are not the same as the rules that govern the behavior of the agents in the social system. Norms used in society are created by other agents or organized groups of agents to govern the functioning of the system toward an idealized standard. In the complex systems perspective the norms established by a society are not universal and function only in the capacity of information.

Societal deviance is often referred to as “anti-social behavior”. From a complex systems perspective, referring to deviance as “anti-social” may perhaps not be an accurate description as the behavior is deviant to a collective understanding of an ideal state of the system, but yet exists as a component of the social system. The present state of the literature and practice on the topic of deviant behavior does not present a single prevailing theory for the cause of deviance. This lack of theoretical consensus provides an ideal opportunity to study the phenomenon of social deviance using a complex adaptive systems approach, as the model can be designed with multiple theoretical perspectives considered and utilized in formulating rules that agents (people) might use to make decisions (conscious or subconscious) before performing or abstaining from acts of deviance. The primary realms of social science that study social deviance are social psychology (in both sociology and psychology), sociology of deviance and criminal justice [5]. This paper does not seek to propose a complex system that applies universally to all forms of deviance or that can be universally implemented across social disciplines (or theoretical

paradigms), but instead seeks to establish a concept for a template of a complex adaptive system that can be used as a general model for all forms of deviance and can be modified to model any specific type of deviance.

The objective for a complex adaptive systems model of deviant behavior is not a singular objective, but multiple objectives. First, as a predictive model it is the objective of the model to predict with some accuracy the rate of occurrence of a particular type of deviant behavior for a specific population. In social science this type of measure is normally quantified in the terms of a certain number of cases over a stable number in the population (such as saying homicide is committed by 1.3 out of every 10,000 people in a population). The model should be able to produce similar types of information and be reasonably accurate in predicting number of occurrences. Another objective of the model is to test theorized contributing factors to deviance. Through computationally assessing those factors it may be possible to determine if their impact on occurrences of deviance is significant.

The primary basis of constructing a complex adaptive systems model of social deviance is that “social agents must continually make choices, either by direct cognition or on stored (but not immutable) heuristics, about their actions [2].” Dialectically constructing individuals in a society as rational agents that make decisions about their actions establishes that there are certain rules and criteria upon which behavior occurs. Rational choice theory is a sociological concept that bridges between complexity science concepts of the agent and social concepts of events of deviance. Rational choice theory accepts that humans are not always rational, but it does establish that most behaviors are enacted as a combination of response to cognitive drives and rational thoughts [6]. The social agent does not decide to be deviant, but attempts to address needs and desires in a rational way. In general, if there is a way to accomplish an objective

(satisfy a need or desire) without violating societal norms, then the social actor will select that option over a deviant option. The difficulty and complexity of calculating whether an agent will exhibit deviant behavior is in understanding all of the factors involved. Factors that may be overlooked in understanding the objective of a social agent when making a decision regarding how to resolve a social/personal discrepancy are the perception of urgency in the need to resolve the discrepancy, a difference in the perceived and actual discrepancy and the intensity at which the discrepancy is perceived. Urgency in resolving a discrepancy may occur if the agent perceives that an opportunity to resolve the issue is fleeting or is somehow a scarcity. The difference in the perceived and actual discrepancy is perhaps the most difficult problem to overcome as to understand the actual discrepancy requires understanding the motives of the agent, which even the agent itself may not understand at a conscious level. The intensity of a discrepancy may vary from agent to agent and therefore be somewhat undeterminable at an agent level [6]. These problems are a difficulty in traditional methods of predictive social science, but are less so in the area of complex systems. The problems are incalculable at the individual agent level, but it may be possible to represent them at a system level or disregard them completely and instead implement a value of anomie in the system itself which can trim effect of those individual differences.

Information is a key component of a complex adaptive systems understanding of social behavior. Page and Miller state “every social agent receives information about the world, processes it, and acts” [2]. This remains true in the understanding of deviant behavior, as is observed in the previously mentioned rational choice theory. From the perspective of the agent all that exists of society is information. The agent does not (and cannot) have a conception of society that is equivalent to the reality of society; each agent understands society through the lens

of experience [7, 2]. The experience of a social agent can come from their environmental context through direct observation or it can come from their links to other social agents. Social agents for the purpose of information collection do not have to be bi-directional links, but can be directional such as receiving information from a news agency. There are various types of information which can be used in the process of decision making for the agent regarding a potential deviance. One of the first pieces of information considered is the knowledge of the societal norm. If the agent is unaware of the norm, then the agent may decide to act on the basis that in the context of their knowledge of societal norms the behavior is not a deviation. Another important piece of information is what type of sanctions may be imposed by other agents in the system if the agent were to act against societal norms. At the background of the decision making process is the agent's own sense of identity [8]. The identity of the agent is constructed through the agent's links to other agents in society and to the agent's previous social experiences. An agent's sense of self is developed based on interactions with other social agents. Interactions which involve the ascription of "positive" traits such as honesty, dependability and kindness to the agent can become integrated into the way that the agent conceives of itself, resulting in the evaluation of a deviant activity potentially being incongruent with the sense of self [9]. This particular analysis of the importance of the information contained in the identity or self-concept presupposes a validity of the human need for congruence. While congruence is a powerful trait in some individuals, in others it has a negligible effect [10].

Following the same reasoning as the use of identity information and congruence as a basis for a decision on deviant behavior, previous decisions of deviance may also contribute to the decision. Information for previous deviations may be in the form of a societal label ascribed to the agent by other agents or the binary logic of whether or not the previous transgression of

norms was followed by sanctions. If an agent identifies as “deviant” or as a particular type of deviant identity (thief, murderer, etc) then that factor is weighed in the decision of whether or not to commit a deviant act. From this perspective the need for identity congruence would place more pressure on the agent to choose to commit the deviant act. It should be noted that simply having the identity placed on the agent by other agents does not result in a change in the decision process. The change only occurs if the agent internalizes the identity and integrates it into the self-concept [8, 10]. It is unclear from the present state of the literature whether or not the integration of a label into the self-concept is a cause of recidivism or if that phenomenon is a unique trait.

Adaptation is not a trait of social deviance, but the deviance itself is an adaptation in the social system [11]. In some cases the deviance is an adaptation that results in a social movement, which is an example of emergence. This view of deviance relies on the natural adaptive ability of the human as a social agent more than on the ability of society to adapt to the needs of the agents [2]. If the needs of an agent are not met by socially acceptable means, then the agent may seek other means to resolve the needs. An act of deviance may be sought as a method to adapt to adverse circumstances which threaten the agent.

Society functions primarily as a dynamic network of agents [12]. An individual’s identity and self-concept is based on the interaction with others in society. The importance of this relationship to the concept of deviance is that agents who have many close social relationships have a more coherent self-concept and as such are less likely to deviate from the perceived expectations of the people around them. Another important aspect of the network structure of society is the concept of cooperation. While it may be disputed whether or not a pure form of altruism exists, in most social systems there is a degree of interdependence between the agents. If

an agent's needs are not being met, but the agent has a sufficient number of quality links to other agents, then it is possible for the agents to reach a cooperative solution to resolve the discrepancy. When there are few links between agents it is harder to establish cooperative bonds and more difficult for an agent to escape the discrepancy. This remaining discrepancy between the agent's situation and the agent's needs or perceived needs may result in the agent deviating from the rules of the social context in an attempt to resolve those discrepancies [2]. In considering a computational approach to modeling the links in a social network both the number of links and the quality of those links must be considered to accurately reflect their impact on the individual. Another aspect of links that must be considered is whether they represent the normalized social system and act as a force for social compliance or if the links are to agents who are also deviant. Links with other agents that are deviant from the social system on the behavior being modeled should be considered as self-organizing, with the potential for emerging as a sub-system.

Humans are not entirely rational social beings. There are many mechanistic qualities and predictable patterns of behavior in society as a whole, but the individual remains unpredictable [13]. The key factors that lead to the seemingly random behavior of the individual agent despite the influence and control of a homogeneous society are the various drives, desires and goals of the individual [14]. The individual is a complex adaptive system within themselves. Each agent is an independent system functioning as a component of the larger societal system [1, 2]. The objective of the human agent is often theorized to be self-actualization. Self-actualization involves the individual meeting goals to make their experiences and external identity consistent with their self-concept, which includes desires and goals [15].

Theoretical and empirically claimed contributing factors to deviance are too numerous to control for in the scope of normal sociological examination. A complex systems approach allows for a systematic and controlled inclusion of factors that are thought to be significant to the overall functioning of the system and as a result to the predictive capacity of the model [1, 16].

Measuring the fitness of a complex adaptive system model of social deviance is dependent upon the available information regarding the phenomenon being modeled. Measurement is dependent upon defining the objective of the specific system and determining how that measurement will be tested. For social science this is especially difficult because each theorist defines social behaviors differently and because there is considerable variation in the reporting of crime and other deviant behaviors [1]. A complex systems model of social behavior therefore may not be capable of having an absolute agreement with other models or predictions. The challenge to using a complex systems model of social behavior is in supporting the system with adequate data to validate it in the context of existing research on social phenomena.

As an example of the implementation of a complex systems approach to deviant behavior, consider the case of academic integrity violations. The goal of a student as specified by the specific social subsystem that is the academic institution defines certain parameters for success. There are also pressures on students from outside the institution to succeed. Those goals are internalized by the student (the agent) as components of identity. The identity functions as information that is used in decisions. Factors of intersectional identity in which the identity of student is combined with other identities the student may carry, such as young adult, friend or athlete. The intersection of the identities may create conflicts in the responsibilities to each component of identity. As such the student may be burdened with social obligations from the other identities, which may inhibit the agent from fulfilling obligations to the student identity. As

such, when confronted with the needs of the student identity, such as in the case of an examination, the agent may have choices to make. If the agent is not prepared for the examination the key choices to be made could be seen as complete the exam based on existing ability, seek other accommodations through the system or commit an act of academic dishonesty. If the agent is knowingly unprepared, then completing the examination based on the level of preparation may represent a violation of the agent's needs and goals. The ability to seek other accommodations through the system would rely on the agent's connection to other agents and having cooperative links with those agents that would allow such accommodations to be possible. For the agent to decide to commit an academic integrity violation requires weighing the potential benefits with the potential risks of the infraction. In the case of this particular type of violation the identity as student may be at risk if the deviance is detected and then sanctioned, whereas deciding to not commit the deviance would have a certainty of diminishing the status of the student identity.

While there are many factors that affect conformity to social norms, a complex systems approach can provide a useful model without attempting to reduce the robustness of the concept of the social system to do so. Complex adaptive systems methodology allows for modeling deviance based on decision-making rules involved at the agent level and on interaction influences at the social network level. Complexity science modeling is a robust method which can expand upon the work already conducted in social sciences.

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